

General Assembly Meeting of the European Astrobiology Institute

3 June 2022

Motion 2

The General Assembly may approve the following Action Plan of the European Astrobiology Institute for the period 2022-2023.

Action plan for the European Astrobiology Institute

Period 2022-2023

Recruitments of institutions

Although we have a very solid basis of membership, we will try to extend our number of Participating Institutions. We especially use BEACON 2023 to recruit further institutions, which will continue up to summer 2022. Such large conferences are a very good opportunity to recruit new members. Furthermore, we have started discussions with the University of Aix-Marseille regarding a membership of that institution. The University of Aix-Marseille also plans to initiate a Graduate school on Astrobiology and the EAI will cooperate with them on that issue. A first visit of the EAI Chair with representatives of Aix-Marseille will take place in June.

Fourth General Assembly

The fifth General Assembly is planned to take place at La Palma Princess Hotel, Fuencaliente de La Palma (ES) from 8th to 12th May 2023. A field trip to astrobiologically interesting sights the Canary Islands will be organised for interested participants after the conference. If the volcanological situation permits it, we will visit the lava field of the La Palma eruption. In addition, there will be a 3 days satellite meeting for students and early career scientists just before the assembly. This will be organised in cooperation with AbGradE. Co-funding will be applied for from Europlanet and the French Astrobiology Society. A team of 7 early career scientists will act as the Scientific Organisation Committee for the event. An ample outreach programme is planned together with the community of Fuencaliente. For the general public we plan to organise a science, star-gazing and music night on Saturday before the conference. Any profits of this event will be for the benefit of the victims of the eruption. Possibly contributing artists have already been approached. Also, an astrobiology-centred games afternoon is planned for the “ordinary” guests of the conference venue. An excursion to telescopes at La Palma and to the new eruption site is also envisaged for the conference attendees.

We also cooperate with the Municipality of Fuencaliente in organising an exhibition about astrobiology at the new visitors centre near the crater of the San Antonio eruption from the 17th Century. Detailed plans of the site have already been made and the EAI Chair as well as members of the WG on Outreach, Media and Corporate Identity have already discussed possible plans as with representatives of the municipality of Fuencaliente in spring 2022.

Apart from taking an active role in the organisation of BEACON 2023, the EAI workshops and summer schools, giving seminars and holding on-line scientific meetings, the Working Groups also plan some special events and activities. The plans for the different scientific Working Groups and Project Teams are depicted as follows:

Thematic WG: Formation and Evolution of Planetary Systems and Detection of Habitable Worlds

The main activities for the rest of 2022 include the completion of the collaborative paper entitled: „Habitable Worlds: Formation, evolution, detection and characterization”. The article will be submitted to the Space Science Reviews. The WGs adopted the following work-plan and timeline for the preparation of our review paper:

18 March:	Online meeting of all the section coordinators (or their proxies), done
14 – 30 March:	Preparation of the zeroth drafts of the sections (meetings of the writing teams, distribution of tasks, accomplished).
31 March:	Finalisation of the zeroth drafts (detailed structure of the sections including subsections, topics that will be addressed, and writing assignments, some thoughts about the key figures to be included).
1 April – 2 June:	Continuation of writing (meetings across different teams, linking the sections, done).
3 June:	Presentation of the first draft - General Assembly: Höör, Sweden.
Until 10 September:	Continuation of writing and revisions
16 September:	Submission of the paper.

The choice of the publishing option (open access or normal) should be discussed.

The WG further plans to organise the Splinter Meeting: Habitable Worlds and Exploration of the Solar System during EPSC 2022 in Granada, Spain (18 – 23 September 2022). Also, the WG will start working on the Working Group page at the EAI Website. Sergio Monai and Erica Bisesi are the WG webmasters.

The EAI summer school „Formation and evolution of planetary systems and habitable planets”, which was supposed to take place on August 19-26, 2020 in the Faculty of Physics, Astronomy and Informatics of the Nicolaus Copernicus University in Toruń (Poland) will be organised in 2023.

Thematic WG: Planetary Environments and Habitability

The main activities for 2022 and 2023 include the completion of the collaborative paper entitled: „Habitable Worlds: Formation, evolution, detection and characterization”. The regular meetings set up in order to monitor the progress and discuss the particular scientific questions covered in the article will be continued. It is planned that the work will be completed at last until BEACON 2023. During the process of writing, some of the already identified scientific topics included in the content of the paper will be transformed into well-defined research projects to be carried on after the work on the article has been completed.

Thematic WG: The pathway to complexity: From simple molecules to first life

During the very successful WG workshop at Heidelberg in early May 2022, several possible themes which the WG should be focusing on have been identified. Those include:

- Compartmentalisation and forming first cells
- Nitrogen chemistry and its role in the formation of complex molecules

- The emergence of homochirality

Since the WG is rather large, the formation of sub-groups covering the above-mentioned themes will be envisaged and leaders will be appointed. This process will take place over summer 2023. It will also help to organise the WG in an efficient way. The subgroups will be encouraged to apply for funding of future activities from appropriate sources (ISSI, COST Action)



Workshop: “The pathway to complexity: From simple molecules to first life”, 2-6 May 2022, Heidelberg, Germany.

Thematic WG: Early life and life under extreme conditions

The WG “Early life and life under extreme conditions”, in collaboration with EANA members and local Azores scientists, will finalize the organization and conduct the workshop “Life Below the surface” in the Azores on October 25th to 27th 2022, followed by a 5-days fieldtrip to different islands where sampling for scientific research will be possible. Topics addressed will include: the characteristics of sub-surface habitats on Earth and possibly beyond; the early evolution of subsurface life including its possible role in the emergence of life; the diversity, metabolisms and survival strategies of subsurface life on Earth, and the possibility of extraterrestrial sub-surface life and its detection. A session will be dedicated to discussion about knowledge gaps and future research to develop. After this workshop, there will be a fieldtrip to the islands of Terceira, Pico, Faial and São Miguel, where participants can visit and sample at interesting field sites (solfatares, lava caves, hot springs, recent lava fields etc.). The WG will also participate to the organization of BEACON 2023, propose thematic scientific sessions and

also plan discussion time for future activities for the whole WG. The WG will also encourage its ECR members to organize an online meeting on a specific topic of their choice. The WG will continue its activities in the ISSI working group "TOWARDS A UNIVERSAL TRACERS PORTAL".

Thematic WG: Biosignatures and the detection of life beyond Earth

The working Group has to be reorganized itself after been constituted in 2020 because new members joined and long Covid-break. The website pages for the working group has to be created and a website responsible has to be nominated. The WG is planning two online workshops in autumn and winter 2022/23 on the topic "astrobiology in future space missions with the main task to search for life", particularly because of new plans and changing or postponed mission plans (ExoMars postponed? / NASA, New Frontiers, ESA Large missions). Activities of the Working Groups will be organised in cooperation with the Project Team "Tracing Life and Identifying Habitable Environments". A summer school on "Biosignatures and the detection Life on Mars" will be held in 2024 in Iceland and the WG will take an active role in its preparation. Also, the General Assembly 2024 will be held in Iceland and the WG will be involved in its preparation. This will be followed by a field trip to Mars analogue landscapes in Iceland.

Thematic WG: Historical, philosophical, societal and ethical issues in astrobiology

The activities of the Working Group will focus on the carrying out of two events in late spring 2022, namely a summer school entitled "Life on Earth and Beyond" and the workshop on "Astrobiology and Society" to be organised in Höör in the days following the summer school, allowing interested scientists and students to attend both events with only one travel. Furthermore, virtual workshops will be held on the focus subjects. A further workshop on legal, societal and ethical questions concerning the commercialisation of space is planned to take place in Kiruna (SE) in 2023 or 2024.

Training (European Astrobiology Campus)

The second round of the EAI Academy will be starting in October 2022 and continue into 2023. It will comprise a series of 16 didactic talks on a range of topics to be decided on in June 2022. First ideas contain

- Missions to explore exoplanets
- Mars Sample Return
- Extreme environments on EARTH
- Lab simulations of planet and satellite atmospheres

Again, the seminars will be offered for free and will be streamed online every two weeks. Each session will include a 30-40 minutes didactic talk given by an expert. The talk will be followed by about 20 minutes of questions and answers. The EAI Academy seminars will be broadcast online via zoom and the sessions will be hosted by the Center for Astrobiology (CAB). At the end of the series, students will be asked to write a review or encyclopaedia entry about a subject of their choice covered by the seminar. The University of Tartu will award 3 ECTS credits to persons who have attended at least 5 seminars and completed either a review or encyclopaedia entry. Both tasks are peer-reviewed for acceptance.

The RED'23 will be held in Le Teich (France) in early spring providing basic training in astrobiology. It is hoped that it can be held in the same format as under pre-pandemic conditions.

In autumn 2022 there will be a training school on *Volcanism, Plate Tectonics, Hydrothermal vents and Life on Early Earth*. This will be organised together with the colleagues from the University of the Azores. The focus will be an introduction into history of early life on Earth and the influence of geodynamic processes on life and the role of volcanism, plate tectonics and hydrothermal vents in the emergence of life.

The summer school on “*Formation of planetary systems and detection of habitable planets and moons*” will take place in Torun (PL) in summer 2022. Visits of interesting sights (Morasko impact crater), museums and group work on outreach will be integrated into the programme of the summer school.

There will be also a training workshop again on “Micro-and nanosatellites in planetary science” which will take place in Tartu (EE) in the first 2 weeks of August 2022. It will contain 2 parts: one introductory part for the newcomers and one discussion and workshop part for the existing teams of scientists and the newcomers alike.

Administratively, a leading group (board) of the European Astrobiology Campus will be installed consisting of both students and faculty members alike. This will ensure that students and early career scientists are involved in the planning of training events at the early stage. Also, the website of the European Astrobiology Campus will be relaunched.

Activity WG: Field sites and Field Site Managements

One of the most important tasks will be the preparation of the two fieldtrips, the one at the Canaries after the General Assembly and the one at the Azores in October/November 2023 . Other plans on a longer range are as follows:

1. Creation of Official Field sites

We plan to create official field sites of the EAI for which the institute provides detailed information to the community. Characterisation of an official field site should be:

- Availability of detailed information on the web about field sites, infrastructure and red tape
- Lab and logistics infrastructure at local universities
- Cooperation with citizen scientist and other organisations
- Use of field sites for training events possible
- A dedicated field officer or more acting as a point of contact, to provide specific information of the given site and to support scientific and logistical planning for the activity at the given location.

Based on the Research Infrastructure proposal that has been submitted and that includes some field sites, the following field sites are envisaged:

- Azores (lava caves and solfatares)
- Iceland (lava caves, hot springs, glaciers, hydrothermal systems Mars-analogue landscapes)

- Romanian caves (ice caves, caves with special environments)
- Southern Italian volcanic areas (Pantelleria, Liparian Islands) in cooperation with the ROBEX alliance in Germany
- Greece: Santorini, Milos, and Nisyros Islands.

We will use the Azores as a first example of creating an official field site of the EAI. The EAI Chair will meet representatives of the University of the Azores, the local government and the very active speleologist society “Os Montanheiros”. Based on experiences with previous expeditions, a strong cooperation between the EAI, the University of the Azores and “Os Montanheiros” has developed. Also, the University of the Azores possesses an important infrastructure which can be used by researchers in future expeditions (and have already been employed in an expedition of young scientists and students). The Fieldtrip after the workshop on the Azores in October 2023 will be used to introduce European Researchers into the sites available at the Azores. We will also create a website about the sites including information about the sites, the infrastructure available and the necessary red tape to perform field work. We will also recruit a voluntary “Field Site Officer” from the University of the Azores staff to coordinate our efforts.

2. Protection of field sites

Another area of activity also will be lobbying work for protection of field sites cooperation with the WG on Funding and Policy. Many sites are endangered due to careless visitors and ruthless industrial and touristic exploitation of astrobiologically relevant field sites. Here we can be really active and with some powerful organisations in our institute we should also have a greater weight to get our voice heard than individual organisations and scientists. We will try to establish a constant dialogue with the Azorean authorities to increase awareness and protection of field sites

3. Preparation of field sites for Mars Sample Return

The task will be to develop Mars-analogue field sites for that mission, together with scientist and organisations active in the mission and with the Project Team on Mars Sample Return. The EAI Chair has established a cooperation with researchers at the University of Akureyri who are specialists in Mars-analogue field sites in Iceland.

Activity WG: Outreach and corporate identity

One major task was the design of the new website, which is now running. It is the task of the Working Groups to appoint webmasters and to create their individual subpages.

In addition, the WG will organize outreach events at BEACON 2023 in La Palma, to benefit both the locals and tourists at the site: a panel discussion about life in the universe, a science-music evening, a stargazing night, and an astrobiology bingo for children.

We have formed a Project Team “Astrobiology and Art” which will be involved in those activities. The team consists of both artists and scientists. Tasks of the team will be to organise cultural events (music performances, art exhibitions, etc.) to promote the EAI and to use art as a means to spread interest to science amongst the public. For 2024 a workshop on “Impacts and their role in the evolution of Life” is planned in Nördlingen (DE, site of the Ries impact crater) and in the frame of this workshop an exhibition on “Impacts in arts” will be organised in

cooperation with a local museum. Impactors (comets and meteorites) have long inspired artists and stones produced by impacts have been used by artists (one of the project team members is a Swedish artist using breccia from the Siljan impact as material for his sculptures). Participants of the summer school “Impacts and their role in the evolution of life” will be involved in the preparation.

During the workshop organised by the WG “*Early life and life under extreme conditions*” an exhibition on life in lava caves will be organised for the general public.

We will also continue and extend the already very successful work with social media (LinkedIn, Facebook, Twitter): Working Groups will be encouraged to take a stronger role in the presence on Social Media.

Activity WG: Dissemination and Intellectual Output

On-line seminars on a biweekly basis or at least monthly basis by the EAI are planned to continue. These can concentrate on the focus themes of the working groups and other hot topics in astrobiology. The WGs have come in with suggestions for speakers and time slots have already been filled until June 2022 and we are confident to find speakers for the remaining time of 2022 and 2023. Those activities are good advertisement of the EAI and create an active life of the Working Groups and Project Teams even under those difficult times.

As in 2021 and 2022, special efforts will be made to allocate seminar slots to early career and, especially, female researchers. Thus, the very good gender balance in our seminars can be kept.

Activity WG: Education

Education activities will carry on collecting astrobiology related educational materials and add a list of materials from non-EAI affiliated sources that are freely available. An important tool is also the Youtube channel with the seminar talks and the EAI Academy lectures. Those have now grown to a remarkable number and there are many views recorded. Furthermore, the WG will contribute to outreach and education activities during the next GA in 2023.

Activity WG: Funding and policy

The WG will focus on the following themes:

- Funding possibilities
- Co-operations with astrobiology organisation outside Europe
- Protection of field sites
- Mars Sample Return Mission

It is very vital that EAI entities are alerted to future funding possibilities on European, regional (e.g. Nordic) and national level. It is also important to work proactively to include astrobiology-related issues into funding and research programmes. The EAI will collaborate with Europlanet in order to create a regular newsletter on possible funding opportunities. The WG will also resume the discussion about partnership agreements with ACA (Australia), SETI (USA) and ELSI (Japan), which was halted due to the pandemic situation. Together with ELSI we plan to submit a bid for a core-to-core collaboration of the JSPS.

One area of activity will be lobbying work for protection of field sites. The WG will also address political issues concerning the Mars Sample Return. These will also be discussed at the meeting in late summer 2022. The WG will also inform EAI entities and their members about relevant policy documents concerning the mission. Concerning the Horizon Europe programme, the EAI will resubmit the proposal for a “Starting Community Grant” in 2022/2023.

Activity WG: Industry Liaison

The following plans are envisaged for the coming years:

- Providing general information about issues concerning industry academia collaborations (both on the web at the EAI website, at scientific meetings and through personal contacts addressing academia as well as industry) including:
 - Planning of academia- industry collaborations
 - Forms of collaboration
 - Co-supervision of students
 - Grants for industry – academia co-operations
 - Patent issues
 - Interested cooperation partners from academia and industry
- Gathering and highlighting examples of successful partnerships between academia and SME/industry
- Alerting the scientific community as well as interested companies to call deadlines for funding of grants focusing on or including industry – academia partnerships
- Providing support for writing proposals for funding of industry-academic co-operations
- Co-organising training events in generic skills for early career astrobiologists in cooperation with the European Astrobiology Campus
- Helping to raise sponsoring of meetings
- Organising information events on “Careers in space technology and biotechnology for astrobiologists” at a regular basis
- Organising fairs and stalls of companies around large events
- As a long-term project: Providing a database for industry – academia collaborations containing:
 - Short presentations of companies interested in cooperation with higher education and research institutions
 - Presentations of research groups and institutions interested in such co-operations
 - A listing of open internships and Ph. D. research positions of astrobiological relevance that are available
 - A listing of companies at our website that are willing to participate in proposals for EU projects (This might make it easier for scientists to find industrial partners)
- Create long-standing co-operations with enterprises (especially SMES) engaged in
 - Ecotourism: training guides and improving knowledge inside companies about the field sites and their ecosystems to foster site preservation and to improve the performance of them and their marketability and benefit to local communities
 - Providers of lab equipment: improving supply chains to enable efficient lab and field site use, especially to institutions in remote areas and Less-represented member states
 - Biotechnology companies: to ensure that marketable research results are exploited by European companies in a sustainable and environmentally friendly way respecting General Data Protection Regulations.

- Mining: Promoting sustainable mining in field sites
 - Provide the European economy with expertise and future personnel by training the next generation of scientists and engineers using a holistic and multidisciplinary approach
- Many of these things are also part of the proposal for a Research Infrastructure Starting Community proposal.

Project Team: Tracing life and identifying habitable environment

The ISSI Team proposal The work of the ISSI initiative "TOWARDS A UNIVERSAL TRACERS PORTAL" will carry out an in-person meeting in June 2022 in Bern. It aims to discuss and brainstorm on tracers of habitability as well as tracers of life (together with potential problems regarding nomenclature, misunderstandings between different scientific fields, how to establish a common language) in three different domains: Earth, Solar System and Exoplanets research.

Project Team: "Protoplanetary disks and their physical and chemical processes"

The team hopes that the submitted proposal for the COST Action will go ahead. If the COST Action is successful, the team will begin recruitment of Action members, and set up management committee and working group chairs and plan activities like scientific cooperations, meetings and summer schools. If the COST Action is unsuccessful, the team will revise and resubmit the proposal in October 2022. In spring 2023 an in-person team workshop will be held at Schloss Ringberg, and the scientific program of this will be aligned with COST Action Working Groups.

The project team "*Impacts and their Role in the Evolution of Life*" will hold a summer school in Nördlingen on the subject on the WG from 4 to 15 September 2023 and a conference in late summer 2024 at the same place. The school will consist of lectures as well as fields work and will be organised in cooperation with local universities, the Ries Crater Museum and the Geopark Ries. Accommodation has been secured and a programme for the summer school is being drafted. Participants of the summer schools will be encouraged to engage also in outreach work. This includes the exhibition "Impacts and Impactors in Art" that will be organised during the conference planned by the project team for 2024 which will take place at a local arts museum and the newly to be created project team "Astrobiology and Arts". A first in-person meeting of the project team is at Rochechouart.

Project team: "Science Fiction as A Tool of Astrobiology Outreach and Education"

For the current anthology we are currently waiting for a few last essays, introduction and afterword before wrapping up the editing and copyediting phase and getting the book ready for publication (in autumn 2022 as planned). It is going to be accompanied by author and scientist interviews and discussions and an online guide for use in education. If the project is successful, a second volume could be prepared for publication in 2024. Other future plans include seminars and workshops on the role of science fiction in communicating science.

Project team: "Mars Sample Return"

The MSR-PT aims to support the preparation and realization of the Mars Sample Return (MSR) initiative, focusing on the European contribution for astrobiology aspects, and also working concurrently with related international efforts, mainly the activities of ESA and NASA. This project team will support the scientific agenda of MSR by direct research activities (providing expertise in astrobiological disciplines indispensable for MSR, such as microbiology,

paleobiology, mineralogy, geology, geochemistry, planetology, chemistry, planetary protection, philosophy etc.). The project team will initiate collaborations, which will widen participation using the interdisciplinary links provided the EAI between their members. However, this project does not intend to orient or influence already existing groups and their activities, but to support collaborative interdisciplinary research that will lead to results in cross-domain disciplines. It will also provide opportunities for researchers at institutions that are not yet involved in the international research to become active in MSR research.

Administration

The administration will be carried out by our host organisation (European Science Foundation).